

Appl. No. 10/632,513
Response Dated July 7, 2005
Reply to Office action dated June 10, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims

1. (currently amended) A damper device for an air handling system, the damper device comprising:

a frame defining an air flow opening;

at least one damper vane for opening and closing the air flow opening;

at least one drive mechanism for turning the damper vane between open and closed positions; and

the damper vane including a main body and also including vane turning surfaces that project outwardly from the main body, the vane turning surfaces being configured for converting air flow into torque for assisting the drive mechanism in turning the damper vane between the open and closed positions.

2. (original) The damper device of claim 1, wherein the damper vane is generally rectangular and includes first and second outer edges positioned on opposite sides of an axis of rotation of the vane, wherein the vane turning surfaces are defined by first and second lip structures positioned respectively at the first and second outer edges.

3. (original) The damper device of claim 2, wherein the first and second lip structures extend along entire lengths of the first and second edges.

4. (original) The damper device of claim 2, wherein the main body of the vane includes opposite first and second major sides, and wherein the first lip structure projects outwardly from the first major side and the second lip structure projects outwardly from the second major side.

5. (original) The damper device of claim 4, wherein the first and second lip structures are generally perpendicular to the main body.

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6. (original) The damper device of claim 4, wherein the drive mechanism turns the damper vane in a first direction of rotation, and wherein the first and second lip structures project outwardly from the main body in directions opposite from the first direction of rotation.

7. (original) The damper device of claim 4, wherein the damper vane has a central axis of rotation, and wherein the damper vane includes a first rib positioned between the first lip structure and the axis of rotation and a second rib positioned between the second lip structure and the axis of rotation, the first rib projecting outwardly from the first side of the main body and the second rib projecting outwardly from the second side of the main body.

8. (original) The damper device of claim 1, wherein the damper vane includes first and second outer edges, wherein an axis of rotation of the damper vane is positioned between the outer edges, and wherein the vane turning surfaces are positioned at the outer edges.

9. (original) The damper device of claim 8, wherein the vane turning surfaces project generally perpendicularly outwardly from the main body.

10. (original) The damper device of claim 8, wherein the vane turning surfaces are defined by first and second lip structures that extend respectively along the first and second outer edges of the damper vane.

11. (original) The damper device of claim 10, wherein the first and second lip structures have lengths that are generally parallel to the axis of rotation of the damper vane.

12. (original) The damper device of claim 1, wherein the drive mechanism includes a stepper motor.

13. (original) The damper device of claim 12, wherein the stepper motor is coupled to the damper vane by a direct connection.

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14. (withdrawn) A damper device for an air handling system, the damper device comprising:

a frame defining an air flow opening;
a plurality of damper vanes for opening and closing the air flow opening;
a drive mechanism for turning the damper vanes between open and closed positions; and
the damper vanes each having a generally rectangular configuration defined by first and second oppositely positioned major edges and first and second oppositely positioned minor edges, the damper vanes also each including a first major side that faces in an opposite direction from a second major side, the damper vanes each further including a first lip positioned at the first major edge and a second lip positioned at the second major edge, the first lips projecting outwardly from the first major sides of the vanes and the second lips projecting outwardly from the second major sides of the damper vanes.

15. (withdrawn) The damper device of claim 14, wherein the damper vanes include first and second damper vanes, and wherein the drive mechanism turns the first and second damper vanes in opposite rotational directions to move the damper vanes between the open and closed positions.

16. (withdrawn) The damper device of claim 15, wherein the air flow opening includes an inner portion and an outer portion, and wherein the damper vanes are rotated such that adjacent the inner portion of the air flow opening the damper vanes move with a direction of air flow through air flow opening and adjacent the outer portion the damper vanes move against the direction of air flow through the air flow opening.

17. (withdrawn) The damper device of claim 14, wherein the damper vanes include first and second damper vanes, and wherein the drive mechanism includes a controller that sequences the opening and closing of the damper vanes such that the first and second damper vanes are not simultaneously moved between the open and closed positions.

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18. (withdrawn) The damper device of claim 16, wherein the drive mechanism includes first and second stepper motors for turning the first and second damper vanes.

19. (withdrawn) The damper device of claim 18, wherein the first stepper motor is connected directly to the first damper vane and the second stepper motor is connected directly to the second damper vane.

20. (withdrawn) A damper vane comprising:

a vane body having a generally rectangular configuration defined by first and second oppositely positioned major edges and first and second oppositely positioned minor edges, the vane body also each including a first major side that faces in an opposite direction from a second major side, the vane body further including a first lip positioned at the first major edge and a second lip positioned at the second major edge, the first lips projecting outwardly from the first major sides of the vanes and the second lips projecting outwardly from the second major sides of the damper vanes.

21. (withdrawn) The damper vane of claim 20, wherein the vane body has a central axis of rotation, and wherein the vane body includes a first rib positioned between the first lip and the axis of rotation and a second rib positioned between the second lip and the axis of rotation, the first rib projecting outwardly from the first major side of the main body and the second rib projecting outwardly from the second major side of the main body.

22. (withdrawn) A damper device for an air handling system, the damper device comprising:

a frame defining an air flow opening;
first and second damper vanes for opening and closing the air flow opening; and
first and second stepper motors respectively coupled to the first and second damper vanes for turning the first and second damper vanes between open and closed positions, the first stepper motor turning the first damper vane in a first rotational direction between the open and closed positions and the second stepper motor turning the second damper vane in a second

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rotational direction between the open and closed positions, the second rotational direction being opposite from the first rotational direction.

23. (withdrawn) A damper device for an air handling system, the damper device comprising:

a frame defining an air flow opening;
first and second damper vanes for opening and closing the air flow opening; and
a drive mechanism for turning the first and second damper vanes between open and closed positions, the drive mechanism including a controller that sequences the opening and closing of the first and second damper vanes such that the first and second damper vanes begin movement between the open and closed positions at different times.

24. (withdrawn) The device of claim 23, wherein the first and second damper vanes are not simultaneously moved between the open and closed positions.

25. (withdrawn) The device of claim 23, wherein the first damper vane begins movement between the open and closed positions, and the second damper vane begins movement between the open and closed positions after the first damper vane has begun movement but before the first damper vane has reached the closed position.

26. (new) The damper device of claim 1, wherein the at least one damper vane includes first and second damper vanes.

27. (new) The damper device of claim 26, wherein the drive mechanism turns the first and second damper vanes in opposite rotational directions to move the damper vanes between the open and closed positions.

28. (new) The damper device of claim 26, wherein the drive mechanism includes a controller that sequences the opening and closing of the damper vanes such that the first and second damper vanes are not simultaneously moved between the open and closed positions.

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29. (new) The damper device of claim 28, wherein the drive mechanism includes first and second stepper motors for turning the first and second damper vanes.